

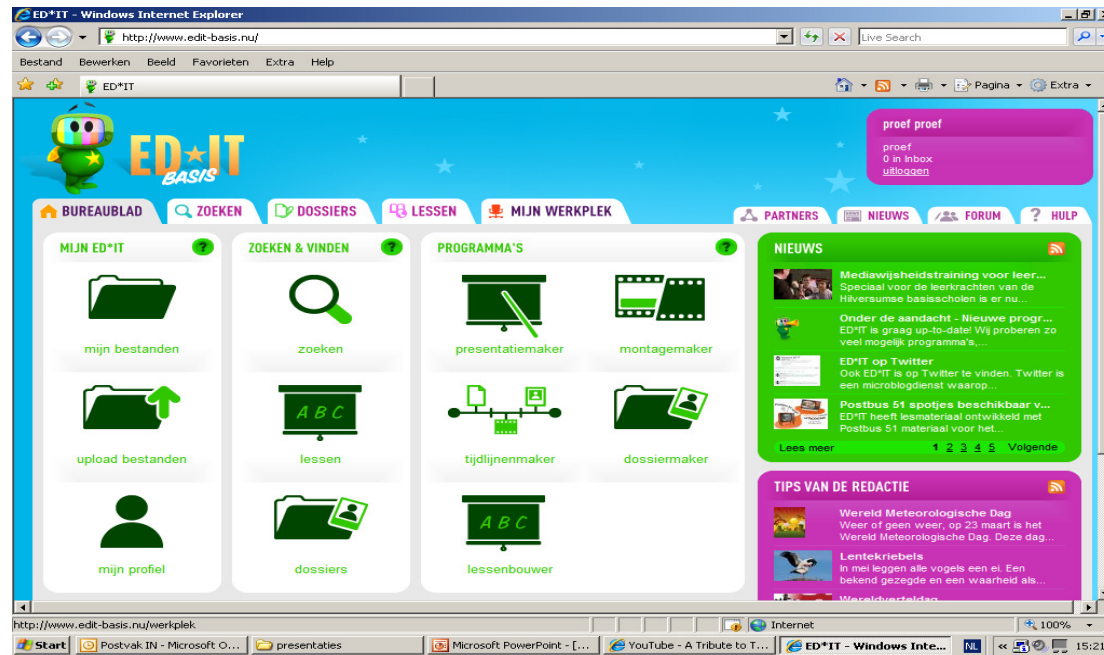
The Effects of Autonomous Learning on Cognitive Load and Learning Results

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Hypermedia



Hypermedia

nonlinear setup: no predesigned learning paths. Information is tied together like a spider web.

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Learning with hypermedia

- + A lot of room for exploration & ability to adjust to interests and needs of the individual student
= good for motivation
- risk of suboptimal selection of learning content & risk of cognitive overload.
= bad for performance



Effective and efficient learning

According to the Cognitive Load theory: Take working memory capacity into account.

Understanding= being able to process all the necessary interacting elements at the same time in working memory.

Learner control can cause extra load on working memory.



Control and Autonomy

Self-Determination Theory: 3 basic psychological needs

(Relatedness, Competence, Autonomy)

Autonomy: the need to experience full volition and conscious choice regarding their activities and goals.

Motivation as the reason (or why) of behavior.

Autonomous vs controlled motivation for a task.

Predisposition for a motivation type: **self regulatory style.**

Effect on learning: understanding vs rote-learning



Research question

Does autonomy support in a hypermedia environment lead to different types of (task) motivation, performance and experienced mental effort compared to learner control and system control?



Method

Participants

69 primary school (grade five) students
(mean age= 10.6 years, $SD = .7$)

2x3 factorial design

ASRQ (autonomous/controlled) x **hypermedia learning**

Environments (Autonomy supportive/ Learner controlled/
System controlled)

Setup: project about **Volcanoes and Earthquakes**

Tasks: 8 short essay questions

Study material: videos

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Method

Pre- measures

Academic Self Regulatory style (factor)

'SAT-scores' provided by the school (covariate)

After each Essay question

students rated their Mental effort on the Mental Effort Rating Scale (= cognitive load measure) .

Log files: videos watched



Method

Post- measures

Intrinsic Motivation Inventory

Basic Psychological Needs Scale

Performance:

1.Factual knowledge test

2.In-depth knowledge test

Mental effort for the tests

Both immediate and repeated 3 months later.

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Results/ Discussion

Task Motivation

in contrast to what we expected: no significant effects of Hypermedia Environment and ASRS on task motivation.

Basic Psychological needs

A interaction effect between Hypermedia Environment and ASRS on the Competence Need scale (Learners with an autonomous ASRS who learned in a system controlled hypermedia environment felt more competent compared to the learners with a controlled ASRS who learned in the same environment.)

However, no effects with regard to Relatedness and, in contrast to what we expected , Autonomy.



Results/ Discussion

Performance

In contrast to our expectations, we found no significant effects of Hypermedia Environment, ASRS or the interaction between these factors on the Factual Knowledge Test (immediate and after 3 months) and the In-Depth Knowledge Test (immediate and after 3 months).



Results/ Discussion

Mental effort

we found a significant difference of ASRS on the reported experienced mental effort during the learning phase, the initial test phase and the test phase after 3 months. (learners with a controlled ASRS experienced more mental effort)

In contrast to our expectations, no differences were found for Hypermedia Environment or the interaction between this factor and ASRS on the mental effort measures.



Results/ Discussion

Learner actions

We found a significant main effect for Hypermedia Environment on the number of (unique) videos watched. (Learners in the autonomous controlled learning condition watched significantly more video's compared to the learner controlled learning condition and the system controlled learning condition.)



Results/ Discussion

Advice

The ASRS had a significant effect on the proportion of advice that was followed. Opposite to what we expected, learners with an autonomous ASRS tended to follow more advice compared to the learners with the controlled ASRS.



Conclusion

The autonomy support we provided within the hypermedia environment did not seem to influence the motivation, performance and experienced mental effort of the learners, the question that remains is whether it is possible to influence motivation within a school environment on a task level.

In the current study learner characteristics (ASRS) appeared to influence the way in which learners deal with a hypermedia environment.



Next Experiment

Investigate the question whether motivation for school and autonomy 'style' (e.g. reactive or reflective) influence how learners handle advice within a hypermedia learning environment, and whether or not this differs for different types of tasks.



Questions?

Thank you for your attention!

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